

## REMARKS

Reconsideration of the application is requested. Claims 1-29, 33-35 and 50 have been canceled. Claims 30-32, 36-49 and 51-52 remain in the application. Claim 51 is the main independent claim for the system, and claim 42 is the main method claim.

### **1. The invention and the field of the invention:**

The invention as defined in main system claim 51 is a system for neutralizing liquid and gas phase chemical waste products that result from a chemical production process and are collected from the production line. The heart of the system of the invention is the pyrolysis/reaction chamber into which are inserted one or more plasma torches. A main point of novelty of the invention is that the liquid or gaseous waste is converted into small droplets by an atomizer located opposite each of the plasma torches. The droplets are sprayed directly into the plume of the plasma torch inside the pyrolysis/reaction chamber where they are instantly disassociated into their constituent atoms or ions, which then recombine to form the gas phase of different molecules.

The pyrolysis/reaction chamber is connected at its "front end" to a pre-pyrolysis subsystem, which comprises a valve and variable speed pump that are activated by sensors and a control unit to supply the fluid chemical waste from the production line at a constant rate via inlet conduits to the pyrolysis/reaction chamber. At its "back end" the pyrolysis/reaction chamber is connected to a post-pyrolysis subsystem that is adapted to collect and/or neutralize the molecules of the various types that escape from the pyrolysis/reaction chamber after recombination. There are sensors that monitor the operating parameters of the plasma torch/es and pre- and post-pyrolysis subsystems and send their output to a control system that activates components of the system to adjust the value of these parameters in order to maintain a pre-determined plasma temperature.

The exact technical specification of the dimensions, materials, and operating conditions of the system depend on the type and quantity of waste products that must be neutralized. These parameters can easily be determined by persons of average skill in the relative arts. In particular, details of the exact types of components that make up the pre- and post-pyrolysis subsystems and their dimensions, design, and materials of which they are constructed will be completely dependent on the nature of the chemical process being carried out. The appropriate pre- and post-pyrolysis subsystem for any given chemical process can easily be designed and built by persons of average skill in the art by applying well known and long-used principles and methods.

**2. Claim Rejections - 35 USC §112 first paragraph:** The Examiner rejected claims 27-41 under 35 USC §112 first paragraph as failing to comply with the enablement requirement and under 35 USC §112 second paragraph as being indefinite. Specifically:

A. The Examiner stated that, with reference to the connection to the production line, “applicant has not disclosed whether a traditional copper or PBS pipe could be used or whether the connection device would have to be corrosion resistant or made of a special type of material or if the chemical is pressurized in order to convey it through the connection or a means for pressurizing the chemical if necessary.”

This rejection seems completely arbitrary and inappropriate. There should be no need to specify the information that the Examiner contends is missing in the claim or any place else in the application. Skilled persons, including not only college trained engineers, but also the technicians and production line workers have enough common sense and experience to be able to provide the appropriate connection without any instruction from the patent application.

B. Claim 37 was rejected by the Examiner since the claimed “radiation cooler” is not described in the specification in such a way as to enable one skilled in the art to make or use the invention.

It is respectfully submitted that, as explained herein above, the exact details of the construction of the components of the post-pyrolysis subsystem are dependent on the nature of the product gases that flow through them. Radiation coolers are well known components of a very wide variety of systems. Specifically in the case of an industrial chemical plant, the engineer designing the post-pyrolysis subsystem has the necessary skill to design in advance, without the necessity of carrying out any experiments, the type and size of radiation cooler appropriate to enable the desired reduction in temperature of the specific type and quantity of gas flowing through it. This is general knowledge that any person skilled in the art possesses without reference to the invention.

**3. Claim Rejections - 35 USC §103:** The Examiner rejected claims 27-29, 32-38, and 40-41 as being unpatentable over US 6,971,323 to Capote et al in view of Monroe Jr. and further in view of US 6,938,562 to Pope. Claims 30-31 are rejected as unpatentable over '323 in view of '954 and '562 and further in view of US 5,615,627 to Marr, Jr. Claim 39 is rejected as unpatentable over '323 in view of '954 and '562 and further in view of US 4,644,877 to Barton et al.

A. As described herein above, the claims of the invention have been amended to more distinctly point out the invention. Claims 30-32, 36-49 and 51-52 remain in the application. The present invention, as recited in system claim 51, is a system for neutralizing liquid and gas phase chemical waste products. The invention is based on a system that pumps the waste through an atomizer causing the formation of a jet of small droplets that is sprayed directly into a plasma stream exiting a plasma torch. This can not be done if the waste is substantially in the solid state.

B. US 6,971,323 is enabling only for an apparatus for treating solid waste. The only feed system taught in '323 is a system based on use of an Archimedes screw (auger). This type of system can only be used with solid material and is not effective with material that is substantially a fluid. '323 states that the waste can be "in the form of

solid and/or liquid material” [col. 3, line 3]; but goes on to teach that “In operation, the auger 16 can form the liquid and solid waste together into a dense cylindrical plug 102 in the feed 17” [col. 4, lines 54-58]. In other words, the waste is introduced into the processing chamber in a substantially solid form.

If one refers to Fig. 2 of the reference and the corresponding passages in the description, one sees that the waste is introduced into the processing chamber at a right angle to the flame of the gas torch and not “opposite” the plasma torch as required in claim 51 of the present application.

C. US 3,611,954 teaches the following: “The burner is preferably housed at one end of a horizontal cylindrical firebrick furnace chamber 11 and the water-diluted waste stream is introduced from the opposite end of the chamber as a countercurrent frustoconical spray envelope 12 preferably enclosing the flame cone 13 but not intermixing with it” [col. 2, lines 8-13] and “The spray cone encloses flame 13 as a near-tangent envelope 12, so that dilution water is speedily vaporized by the flame combustion products which exhaust, together with organic material surviving the combustion, out through vertical stack 18” [col. 2, lines 40-44]. ‘954 teaches away from the present invention, which requires that the waste be sprayed directly into the plasma stream and not around it.

In the present invention the waste is pumped through the inlet conduits and nozzles at their ends at sufficient pressure to form the small droplets. In the apparatus of ‘954 “the organic waste to be disposed of is supplied under pressure to nozzle 17 through a line 19 and atomization air is supplied through a separate line 20” [col. 2, lines 45-47].

The apparatus taught in ‘954 is designed to spray the waste material at the heat source in a different manner than the atomizer of the present invention. Therefore, the basic designs of the nozzles are necessarily structurally very different and they are not

interchangeable. In addition '954 requires the use of a separate source of compressed air to pressurize the waste in order to form a spray cone having the desired geometry. The pre-pyrolysis subsystem of the present invention uses a pump to pressurize the waste. Thus, structurally there are significant differences between the apparatus taught in '954 and the system of the invention.

**D. Conclusions:**

The Examiner's contention that it would have been obvious to combine the atomizer and its orientation in '954 with the apparatus of '323 to arrive at the apparatus of the invention is at cross purposes with the disclosures of these references. In the description of the present application the position of the nozzle relative to the plasma torch is described as "opposite", which is generally understood to mean (see for example, <http://www.websters-online-dictionary.org/definition/opposite>) "being directly across from each other; facing". In the figures, the nozzle and torch are shown satisfying this definition and as being essentially coaxial. The advantages of this arrangement are explained in the application.

The apparatus resulting from any combination of the teachings suggested by the Examiner must result in an apparatus that has all the features of the invention. Applicant is not convinced that the combination suggested by the Examiner could be made and even if it could that the result would be the apparatus of the invention. For example, positioning a nozzle opposite the plasma torches in the apparatus of '323 would either mean that the slag pool is between the nozzle and the torch or that the nozzle is located inside the slag pool – neither of these arrangements would allow liquid waste to be sprayed into the plasma plume. Alternately, if the apparatus of '323 were completely redesigned such that the plasma torches and nozzle that replaces the feed system were located in a plane parallel to the surface of the slag pool, then the waste could be sprayed into the plasma plume, but the plasma torches could not be used to provide heat to the surface of the slag pool and keep the molten material from solidifying at the bottom of the chamber. Any conceivable use of the feed system of '954 with the

apparatus of '323 as suggested by the Examiner would require such major changes to the structure of the apparatus of '323 that the resultant apparatus would be an entirely new apparatus and not a combination of '323 and '695 that would be recognizable as a modified embodiment of either one of them.

As said, the feed system described in '954 teaches away from the atomizer of claim 1. The feed system described in '954 is deliberately given structural features that create a spray cone that envelopes the burner flame. Claim 51 specifically requires the atomizer to spray a jet of small droplets directly into the plasma steam. Therefore, if it were physically possible to modify the apparatus of '323 by replacing its waste feed system with the feed system taught in '954, the resulting apparatus would neither be structurally the same as the system of claim 51 nor would it be capable of performing the same function in the same way.

Finally there would be no motivation to modify the apparatus of '323 with the atomizer of '954. The apparatus of '323 was invented to solve a specific technical problem, i.e. to treat waste. The nature of the described waste feed system indicates that the waste must be solid or predominantly solid waste and there would be no expectation that this type of waste could be sprayed through a nozzle of any design.

For at least the above reasons, claim 51 is inventive over '323 in view of the teachings of '954.

Since independent claim 51 has been shown to be inventive over the cited prior art, and claims 30-32, 36-41 and 52 are either directly or indirectly dependent on claim 51 and include all of its limitations, these dependent claims are likewise allowable for the same reasons. Claims 42-49 recite a method that utilizes the apparatus of claim 51 and therefore contains all the essential limitations of claim 51, and are therefore allowable.

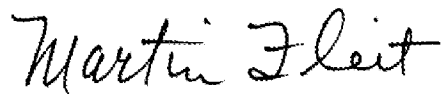
Appl. No. 10/596,690  
Amendment Dated November 13, 2009  
Reply to Office Action of June 25, 2009

It is respectfully submitted that all of the amended claims remaining in the application are now in condition for allowance.

In light of the foregoing remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

It is respectfully requested that, if necessary to effect a timely response, this paper be considered as a Petition for an Extension of Time, time sufficient, to effect a timely response, and shortages in this or other fees, be charged, or any overpayment in fees be credited, to the Deposit Account of the undersigned, Account No. 500601 (Docket no. 7640-X06-060).

Respectfully submitted,

A handwritten signature in black ink that reads "Martin Fleit". The script is cursive and fluid.

Martin Fleit, Reg. #16,900

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